




Department of Energy
National Nuclear Security Administration
Washington, DC 20585

July 9, 2009

OFFICE OF THE ADMINISTRATOR

MEMORANDUM FOR: DEPUTY ADMINISTRATOR FOR DEFENSE PROGRAMS
DEPUTY ADMINISTRATOR FOR DEFENSE NUCLEAR NONPROLIFERATION
ASSOCIATE ADMINISTRATOR FOR INFRASTRUCTURE AND ENVIRONMENT

FROM: THOMAS P. D'AGOSTINO 
CENTRAL TECHNICAL AUTHORITY

SUBJECT: Guidance and Expectations for DOE-STD-1189-2008, *Integration of Safety into the Design Process*, Natural Phenomena Hazard Design Basis Criteria for Chemical Hazard Safety Structures, Systems and Components

REFERENCE: May 8, 2008 Memorandum from Glenn Podonsky to Thomas D'Agostino, C.H. Albright, and Raymond Orbach, Subject: *Issuance of Department of Energy Standard 1189*

On January 26, 2009, the Chief of Defense Nuclear Safety (CDNS) received an e-mail request from the Los Alamos Site Office (LASO), "requesting a CDNS interpretation of the DOE-STD-1189, *Integration of Safety into the Design Process* seismic design basis requirements for chemical hazard safety-credited SSCs [structures, systems, and components]." LASO raised a question of whether DOE-STD-1189, Appendix A, Section A.1, *Seismic Design Basis*, and its associated criteria, apply to chemical hazard safety SSCs, in addition to safety SSCs for radiological hazards. Appendix A specifically states that the criteria contained therein "relate to radiological hazards only" but the Standard does not provide or endorse analogous criteria for chemical hazards.

This omission creates several ambiguities in the Standard that need to be addressed at a level beyond that which can be treated by CDNS advice. As an interim measure, some of the more time-sensitive needs for clarification are addressed in this memorandum. I am directing the Chief of Defense Nuclear Safety to continue to work with the Office of Health, Safety and Security (HSS) and Office of Environmental Management (EM)



personnel to address the implementation issues/gaps associated with this Standard, taking into account the chemical hazard expectations set forth in this memorandum. It is my expectation that these efforts will culminate in the eventual revision of DOE-STD-1189 and other applicable Directives and Standards.

On May 8, 2008, HSS issued a memorandum (attached) regarding the implementation of DOE-STD-1189. The memorandum provided a schedule for updating Directives impacted by this Standard along with suggestions for addressing impacts until final revisions are in place. The Standard had a significant impact on the treatment of natural phenomena hazards (NPH) for DOE nuclear facilities, and HSS provided specific recommendations for addressing those impacts. These recommendations did not provide specific guidance with respect to chemical hazards, however.

Over the past several months, the Chief of Defense Nuclear Safety worked with the Defense Programs Office of Safety, the Los Alamos and Y-12 Site Offices, the Office of Fissile Materials Disposition at the Savannah River Site, HSS and EM to re-evaluate draft guidance that HSS had developed, but not included in their May 2008 recommendations. A set of revised expectations, reiterated below, has been coordinated with your organizations. These expectations are generally consistent with a policy memorandum that EM issued on April 15, 2009 for use within EM.

I am issuing these expectations for use by NNSA personnel and contractors when selecting or approving NPH design basis criteria for safety SSCs in Hazard Category 1, 2 or 3 nuclear facilities. These expectations are applicable to controls that are credited for prevention or mitigation of NPH-initiated chemical hazards.

The Deputy Administrator for Defense Programs and for Defense Nuclear Nonproliferation and the Associate Administrator for Infrastructure and Environment should provide these expectations to their Federal Project Directors for use on NNSA projects. For projects in the Mission Need Stage and Conceptual Design Stage, these expectations must be implemented. Projects in the Preliminary Design Stage and major modifications in existing facilities should consult with the Acquisition Executive regarding the applicability of these expectations. For projects in the Final Design Stage, these expectations are not required to be implemented.

- 1) Safety significant SSCs selected to protect offsite or onsite (100m) individuals from chemical hazards must be initially categorized as Seismic Design Category (SDC)-3 when seismic hazards are involved, or Performance Category (PC)-3 for other NPH-initiated events. Suggested guidelines for selecting safety significant SSCs to protect offsite or onsite (100m) individuals from chemical hazards may be found in Appendix B of DOE-STD-1189.

SDC-2 or PC-2 categorization may be adopted with appropriate justification. Specifically, SDC-2 or PC-2 categorization may be justified if, based on technical and/or cost-benefit considerations, SDC-3 or PC-3 categorization would create an unreasonable burden on the project. This technical justification

and/or cost-benefit analysis must be forwarded to the Acquisition Executive for approval, with a copy provided to the Chief of Defense Nuclear Safety.

- 2) Safety significant SSCs selected for chemical hazards to protect facility workers who are required to remain in the facility either for safe shutdown or to perform another safety related purpose must be initially categorized as SDC-3 when seismic hazards are involved, or PC-3 for other NPH-initiated events. Suggested guidelines for selecting safety significant SSCs to protect facility workers from chemical hazards may be found in Appendix C of DOE-STD-1189.

SDC-2 or PC-2 categorization may be adopted with appropriate justification. Specifically, SDC-2 or PC-2 categorization may be justified if, based on technical and/or cost-benefit considerations, SDC-3 or PC-3 categorization would create an unreasonable burden on the project. This technical justification and/or cost-benefit analysis must be forwarded to the Acquisition Executive for approval, with a copy provided to the Chief of Defense Nuclear Safety.

- 3) Safety significant SSCs selected to protect other facility workers from chemical hazards must be categorized as SDC-2 when seismic hazards are involved, or PC-2 for other NPH-initiated events.
- 4) For SSCs that must be designed for seismic and wind, flood and snow loads, such as external building structures, there will be a need to resolve the differences in design requirements identified by the Seismic Design Categorization and the Performance Categorization resulting from consideration of wind, flood and snow loads. This resolution must be done conservatively; i.e., the SSC design must achieve the desired protection for the applicable NPH loads. Similarly, differences in design requirements identified by the Seismic Design Categorization/ Performance Categorization resulting from the evaluation of chemical versus radiological hazards must also be resolved conservatively.

Consistent with Appendix A of DOE-STD-1189 for radiological hazards, it is intended that the requirements of Section 5 of ANS Standard 2.26-2004, *Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design*, and the guidance in Appendix B of that Standard be used for selection of the appropriate Limit States for chemical hazard SSCs performing the safety functions specified. The resulting combination of SDC and Limit State selection provides the seismic design basis for chemical hazard SSCs to be implemented in design through ASCE/SEI 43-05, *Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities*.

Considering the unique aspects of chemical releases, the criteria and supplemental guidance in Appendix A, Section A.1 of DOE-STD-1189 for SDC and Limit State selection must be used for chemical hazard safety SSCs, with the following exceptions:

- Table A-1, *Guidance for SDC Based on Unmitigated Consequences of SSC Failures in a Seismic Event* does not apply. The expectations set forth in this memorandum are to be used instead of this table; and,
- The use of International Commission on Radiological Protection (ICRP) dose conversion factors (DCFs) does not apply. ICRP DCFs are not applicable for chemical hazards.

For public exposure calculations, the discussions on source term calculation and atmospheric dispersion in Appendix A of DOE-STD-3009-94, CN 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, are generally applicable with respect to chemical hazards. Airborne release fractions should be replaced by applicable factors for a chemical release, such as volatility and temperature. For the 100m collocated worker calculations, the X/Q value at 100m specified in Appendix A of DOE-STD-1189 for radiological dose calculations ($3.5E-3$ sec/m³) must be used for the air dispersion value for chemical releases, except where it is not conservative for the application (such as when the material is a heavy gas or in a high wind/tornado condition). In such conditions, a conservative value must be determined and used. When non-seismic NPH are considered, Limit States do not apply. For NNSA purposes, the criteria for selecting an SDC or PC with respect to chemical hazard safety SSCs must rely on conservative bases for unmitigated accident analysis.

If you have any questions or comments regarding these expectations, please contact Don Nichols or Patrick Cahalane of my staff at 202-586-8216 or 202-586-5332, respectively.

Attachments

cc: J. McConnell, NA-171
K. Loll, NA-171.1
R. Frenck, NA-54
A. Lawrence, HS-20
J. O'Brien, HS-21
D. Chung, EM-60
C. Sohn, SC-3

Poole, Robert M.

From: Vozella, Joseph
Sent: Monday, July 13, 2009 7:02 AM
To: Poole, Robert M.; Griego, Juan
Cc: Le-Doux, Herman
Subject: FW: Signed memo from the Administrator - 1189 chemical hazards memo
Importance: High
Attachments: NA-1_signed_dtd_7_9_09.PDF

Bob/Juan

Need to consider how this info gets to the lab. Juan--you own 1189?????don't you

Voz

From: Keilers, Charles H.
Sent: Friday, July 10, 2009 2:11 PM
To: Winchell, Donald L.; Snyder, Roger; Griego, Juan
Cc: Vozella, Joseph
Subject: FW: Signed memo from the Administrator - 1189 chemical hazards memo
Importance: High

This arose from an inquiry to CDNS by Fishahs, which led to discovery of a gap in 1189.

This guidance essentially invokes PC-3/SDC-3 for new or modified chemical-hazard facilities as the starting point, but then allows invoking PC-2/SDC-2 with technical basis and cost-benefit justification.

PC-2/SDC-2 equates to UBC "essential facilities": fire stations, hospitals, etc.

DOE invented PC-3/SDC-3 in the early 1990 focused on non-reactor nuclear facilities with an important radioactive containment function. In risk space, PC-3 roughly corresponds to the log-mid-point between a UBC essential facility and an NRC-licensed reactor.

There is a view that PC-3/SDC-3 may be excessive for chemical hazards, but I understand that CDNS has chased that question and determined that these requirements are equivalent to what EM and commercial industry now invokes; I have little current insight on that.

For what it is worth.
chk

From: Cahalane, Patrick [mailto:Patrick.Cahalane@nnsa.doe.gov]
Sent: Friday, July 10, 2009 1:41 PM
To: Vozella, Joseph; Keilers, Charles H.; Fischahs, Christopher; Christenbury, Glenn; McConnell, James J (HQ); Loll, Kim R (HQ); White, William I (HQ); Delapaz, Andrew F (HQ)
Cc: Nichols, Don (HQ); Picha, Kenneth (HQ); O'Brien, James (HQ)
Subject: Signed memo from the Administrator - 1189 chemical hazards memo
Importance: High

All,

7/13/2009

Here's an advance electronic copy for your information and use.

Thanks,

Pat Cahalane
NA-2.1, CDNS Office
(202) 586-5332